SUPPORTING THE MANAGEMENT OF FALL ARMYWORM IN AFRICA AND ASIA: BEST PRACTICES AND LESSONS LEARNED

PRESENTATION AUDIO TRANSCRIPT

JUNE 18, 2020

PRESENTERS

Robert Bertram, USAID Bureau for Resilience and Food Security

Joe Huesing, Huesing Agricultural and Educational Consulting LLC

Sarah Page, Catholic Relief Services

Paul Jepson, Oregon State University

Dan McGrath, Oregon State University

Boddupalli Maruthi Prasanna, The International Maize and Wheat Improvement Center

MODERATOR

Zachary Baquet, USAID Bureau for Resilience and Food Security

Zachary Baquet:

Hello everyone. On behalf of Feed the Future and the USA Bureau for Resilience and Food Security, I welcome you to our webinar supporting the management of Fall armyworm in Africa and Asia best practices and lessons learned. My name is Zachary Baquet, Knowledge Management Advisor with the Bureau for Resilience and Food Security and today's webinar host. I will facilitate today's webinar, so you'll hear my voice periodically, see my video occasionally, especially during our question and answer session.

Zachary Baquet:

Before we dive into the content, I'd like to go over a few items to orient you to the webinar. First, please do use the chat box to introduce yourself, ask questions, and share resources. We really appreciate it, so this helps to facilitate peer to peer learning and helps us to learn even more as we go along. We'll be collecting your questions throughout the webinar, and we'll have a Q and A session at the end and try to address as many as possible.

Zachary Baquet:

We'll also be providing the slides and make those available for download. And we will also be, at the end of this webinar, having the recording and other resources available to you that will be mailed to you, have you registered... for those who have registered for the event. They will also be available up on Agralinks on the event page. As I noted, lastly, we are recording this webinar and we'll post those resources.

Zachary Baquet:

Onwards to our presentations and discussions on supporting the management of Fall armyworm in Africa and Asia, best practices and lessons learned. With that, let me welcome Rob Bertram, chief scientists in USA's Bureau for Resilience and Food Security. He serves as a key advisor on a range of technical and program issues to advance global food security and nutrition. In this role, he leads USAID evidence-based efforts to advance research, technology and implementation in support of the US government's global hunger and food security initiative, Feed the Future. He previously served as Director of the Office of Agriculture, Research and Policy in the Bureau for Food Security. Prior to that, he guided USAID investments in agriculture and natural resources research for many years. Dr. Bertram's academic background is plant breeding and genetics, includes degrees from University of California Davis, University of Minnesota, and the University of Maryland. Dr. Bertram will introduce the session and the speakers. I hand it over to you, Rob.

Rob Bertram:

Thanks, Zachary and greetings everyone. I'm hoping we have a global audience here so I won't say good morning because it could be any time of day. Thanks to all the organizers... the KDLT for helping us convene this Agralink session. This is a bit of a continuing saga. This is the most recent chapter of something that happened, started about four years ago when fall armyworm, which is native to the Americas, somehow got to Africa. And since then it has spread across the world. Even having reached Australia, there are very few places now where this pest is not found. And the response to this has been a whole range of efforts, but especially a partnership that USAID began alongside our colleagues at USDA state department and others to take the learning essentially that we had from the Americas and rapidly engage with partners across the world, in the Americas where the pest was well known, but also in Africa and Asia, where it was causing a huge losses.

Rob Bertram:

In 2018, for example, there were estimates that up to 17 million tons of maize could be lost due to the fall armyworm, which is enough maize to feed, or help feed, tens of millions of people. And of course, the terrible thing about this pest is that it, like locusts, it hits small holders very hard. Less resource endowed farmers where maize is a critical aspect of food security. It's impacts, as we know, are not limited to maize, it will attack a number of different crop species, but maize is its favorite along with sorghum, for example.

Rob Bertram:

But unlike the locust situation, which of course we're also dealing with right now in the world, this is a threat that's much more diffuse. It doesn't lend itself to a big centralized approach and hence the knowledge piece and the local understanding of how to manage track and respond to this pest is really where the action is.

Rob Bertram:

This partnership that began several years ago has involved partners from around the world. And we're going to have the pleasure of hearing from some of the key players in this space who have worked so hard and so quickly to stand up, share learning, and put in place evidence-based approaches for managing this pest through a number of strategic entry points.

Rob Bertram:

The other thing I want to just say in opening is that it's great to see our friends at the food and agricultural organization of the United Nation stand up very recently, what's called a global action on fall armyworm. And again, this is about trying to move beyond a set of working groups, technical working groups that FAO set up some years ago, and move it towards something that is more unified, more strategic, and more likely to aggregate, disseminate and engender broad response across the whole sets of regions that are being impacted by this pest. I'm delighted that that that has come up. And I think the

basis for a lot of that work is coming out of the partnerships that came out of the fall armyworm task force set up several years ago by our then administrator, Mark Green.

Rob Bertram:

Without any further ado, I'd like to turn now to our speaker, and our first speaker today is Joe Huesing. Joe is an entomologist by training. He worked for years with [inaudible 00:06:56] in USAID, and he's continuing as a strategic advisor, including to the fall armyworm, the R4D, Research for Development, which we're going to be hearing more about. That was another partnership set up a couple of years ago to globally link together the research partners and provide the evidence base. And Joe has been a very active partner throughout. Thanks Joe, for all you've contributed and over to you.

Joe Huesing:

Yay. Hello. Can you hear me okay?

Zachary Baquet:

Yes.

Joe Huesing:

Okay. Very good. Thank you. Okay. What I'm going to do is just briefly recap some of the lessons learned from the fall armyworm campaign to help set the stage for the subsequent speakers so that we all have a common framework. The fall armyworm was first published on in 2016 for researchers from my ITA in West Africa. Although it's likely the pest was on the continent sometime earlier. A number of farmers we speak to across the continent suggest 2014 or perhaps even earlier. Importantly, work from the USDA, and this is primarily [inaudible 00:08:30] suggest that the bio-type of the fall armyworm that was introduced into Africa comes from the South Florida Caribbean region. We don't know precisely when, where, or how many times an introduction occurred into Africa but this piece of information is crucial because it suggests that there was an extreme genetic bottleneck that occurred when a small number of these moths were entered into the continent. That's important because currently we don't have any evidence that any of the BT resistance alleles transfer with that population, but we also don't have any data to firmly confirm that. That's an ongoing piece of work.

Joe Huesing:

And then secondly, we don't know the status of any of the pesticide resistance alleles that that population may be carrying. Currently, it's believed that the populations that are spreading across Asia were derived from this single founder population in Africa. Finally, it does appear that it is primarily the maize strain, perhaps with some hybridization before entering was... they're alive in Africa. And which explains why the predominant species of plants that are attacked are maize and sorghum.

Joe Huesing:

As many of you know, the fall armyworm does not have the capacity to diapause, but is endemic in much of the tropical Americas. Now, this is essentially from Southern Brazil to South Florida. That same situation will occur across much of Asia. And that's what we're seeing now, where the challenge will be to control this pass in an area where there are multiple overlapping generations of the past.

Joe Huesing:

What can we expect? Getting good assessment data on impacts of insects and maize are difficult. In general, low resource farmers don't weigh their maize yields at the end of the season and at best, some may take a volume metric measure of yield. In the Americas, farmers generally know the impacts of the pests on their crop because the material is weighed at harvest, farmers keep records and they can roughly assign cause and effect to yield losses from year to year. We don't have those kinds of data in much of the developing world. And so the assessments for losses due to the fall armyworm are derived mainly from farmer surveys, but you can see how complex this equation is because the damage loss is a function of the maize variety and [inaudible 00:11:35] going to talk to you a lot about differences in response to different maize varieties, the agronomic practices that farmers use, whether they fertilize or adjust soil pH and the stage of the maize that's attached, different stages of maize are more susceptible to fall armyworm attack.

Joe Huesing:

The intensity's important. Whether the percentage is high or low within a field is an important characteristic to assess damage. And then the number of generations of fall armyworm. It's possible in 120 day maize, for example, to have three or four generations attack that maize. What we can say, our researchers like the Gruden coworkers working in Kenya, as well as Ethiopia using farmers surveys, suggest that somewhere on the order of 40 to 50 per cent of the maize has been lost to fall armyworm this year.

Joe Huesing:

GM trials, genetically modified maize that are ongoing in countries like Kenya, where identical varieties of maize are compared side by side with the only difference. And in the resistant variety, carrying a resistance gene to the fall army worm suggests that the maze losses are on the order of 35 per cent. Bob and Dreary and coworkers just published a very nice paper and they have a lot of yield data. And if the yield loss state weren't summarized per se, I didn't have time to go through those, but they can show with an insecticide trial using MMF and [inaudible 00:13:05], which is very effective at controlling fall armyworm. That they get more than double yields with control from that material. [inaudible 00:13:13] and others have shown that in a similar sorts of trials where insecticides were applied as a control

measure, yield savings could be somewhere between, let's say, 35 and almost 60 per cent. So overall I think the data suggests pretty strongly, depending on where they come from, that yield losses of around 10 to 50 per cent due to this past are not unreasonable.

Joe Huesing:

Full armyworm like other pests is best controlled within an integrated pest management framework. That framework is typically illustrated by use of a triangle in which the pillars of integrated pest management post plant resistance, conservation bio-control and pesticides when needed are shown on the corners of the triangle. IPM assumes that farmers use some level of good agricultural practices or cultural controls, things like soil, health, fertilizer, soil pH, and planting date. It's important to remember that the key protection goal for a farmer is maize grain. The key technology to put in place for control of the pest like fall armyworm is host plant resistance, and [inaudible 00:14:33] is going to talk to you about that in just a moment. If the proper cultural controls are put into place, the weather cooperates, a proper nice resistant maize variety is used, that generally leads to conservation bio-control, which should suppress test populations below economic injury. If a farmer checks their field, they scoured their field and they find that has not happened, they may have to resort to a pesticide treatment of some sort. And for the small resource farmer, this would be a safer use pesticide that can be applied safely with minimal PTV. This is a subject that Paul Jefferson's going to talk about in detail. And then Dan McGrath will also talk about scouting procedures to address different clientele within this landscape.

Joe Huesing:

The framework that we have put in place, the guy at IPM framework is based on three central tenants, knowledge, tools, and policy. We have to teach farmers how to use good agricultural practices and integrated pest management. We have to provide them with safer use tools like a safer use pesticide, but this can only happen within a policy enabling environment. The simple process of registering a pesticide for use against fall armyworm in those countries takes on the order of two years. So you can imagine a farmer has away two years once the fall armyworm shows up, to even have a chance of getting a pesticide register [inaudible 00:16:12] , and that's an area we're working on very actively. And I'm happy to say that the East Africa community is well ahead of many stakeholders in this area in harmonizing pesticide regulation processes. At the end of the day, evaluating these these tools as a function of the cost, the efficacy, the safety, the scalability, and the sustainability of the technology. Thank you.

Rob Bertram:

Thank you, Joe. And thank you very much also for sticking to time. And since you did stick to time, we can take one quick question. If we have any Zachary from the audience? In terms of clarification, we will have 20 minutes at the end for further discussion. This is really more just if there's any clarifying questions for Joe.

Zachary Baquet:

Thanks, Rob. We do have one clarifying question from a Washington [inaudible 00:17:20]. Are there commercialized bio-control agents that are in wide use in the Americas?

Joe Huesing:

Yes. There are commercially available products for control of fall armyworm. Brazil, for example, uses a bio factory type system with trichogramma, which is a parasitic wasp that attacks fall armyworm. And this is a good example of how to place the criteria, or how to use the criteria, cost efficacy, scalability, and sustainability. As best as I can tell, the cost of those treatments are probably something on the order of $150 per hectare, requiring something on the order of six treatments per season. Within the Brazil agricultural system, about 3% of the maize crop is traded with what we would call augmentative bio-control. There are data that suggests that that approach works. But at present it's quite expensive and thus scaling that and sustaining it would be a challenge that a country, if they chose to use that approach, would have to address, over.

Zachary Baquet:

Rob, you seem like you're on mute. Do we have time for another question [crosstalk 00:18:47].

Rob Bertram:

Sorry for that Zachary. So I was saying, thank you, Joe. Thanks for the question and the excellent presentation. And I think one of the key points that Joe has made is that fall armyworm is here to stay. In many areas, it's going to be endemic throughout the year. In some areas it maybe more migratory as it is in parts of the United States, for example.

Rob Bertram:

But I think that's a great segue to our next speaker. And that is Professor Emeritus Dan McGrath. And Dan comes from Oregon State University and worked for decades in Oregon's Willamette Valley. And he worked on vegetable production, integrated pest management and sustainable agriculture. And since he retired a few years ago, he's been very active in this global effort to control and combat fall armyworm across sub-Saharan Africa and Asia. So Dan is somebody who's taken years of experience with this pest and integrated pest management and is working with partners in Africa and Asia now. And he's worked for example, with a number of USA missions in Ghana, Ethiopia, and Bangladesh to train farmers how to scout fields, how to really manage pest and take the proper IPM steps in ways that actually match with the farmers' needs and experience. So Dan, over to you, and thanks so much for joining us today.

Zachary Baquet:

Dan, you might be on mute.

Daniel McGrath:

Thank you for having me. Today, I'm going to be talking about monitoring and scouting, but I'm going to be specifically focusing on three areas, high versus low density monitoring systems, scouting as an educational platform for multiple level audiences, and efficacy testing. When fall armyworm first arrives in a country, governments invariably establish large complex, expensive monitoring systems with hundreds of monitoring sites. And the purpose of the high density systems include early detection, detecting the arrival of fall armyworm, and these serve as the basis for pest alerts for farmers. Tracking the spread and deploying resources, tracking the spread of fall armyworm and engaging the farming community in surveillance, using phones, for example, to report what they find. But the overall focus is trying to prevent the establishment of fall armyworm.

Daniel McGrath:

Now the monitoring sites serve as very effective monitoring, I mean educational platforms, but after about three to four months, farmers get tired of test alerts. They need more information than just the presence or absence of fall army worm. What they need to know is the level of pest pressure. What is the egg laying pressure? Is it high? Is it low?

Daniel McGrath:

USAID in Ghana, Ethiopia and Bangladesh successfully tested an alternative monitoring system using low density, a low density approach. The purpose of the alternative system was different. The purpose was to detect and report variation and in egg laying pressure to provide decision support to farmers, not only with regards to high egg laying pressure, but also low egg laying pressure. And to promote farmer focus on biological and cultural controls and reduce pesticide use when egg laying pressure is low.

Daniel McGrath:

Now, this is a dataset from the Brong Ahafo region of Ghana in West Africa. The vertical axis is the average moths per trap per day over time on the horizontal axis from April, may, June and July. So this line, our math counts, average math counts across the entire region, and this represents egg laying pressure. And in summary, I would say that the maize during this production year that tasseled during the peak in egg laying pressure had between 50 and 75 per cent cob damage. Whereas the maize that tasseled in this low pressure period had essentially no cob damage. This was generated with just 10 monitoring sites across about 40,000 square kilometers. Low density monitoring systems are cost effective and they go beyond test alerts. Low density monitoring systems support farmers, especially when they are trying to reduce

PART 1 OF 4 ENDS [00:24:04]

Daniel McGrath:

Support farmers, especially when they are trying to reduce pesticide use without putting their crop at risk when egg laying pressure is low. So, let's talk about scouting.

Daniel McGrath:

Scouting schools are an effective teaching method for multiple audiences, small holders, lead farmers, and agricultural professionals. If we focus for the moment on small holders, we all know that many of them are not going to go home and start formally scouting their fields; but the scouting field schools are a tremendous way to convey key concepts in Fall armyworm management. For example, what do farmers need to know? Well, just because you have Fall armyworms does not necessarily mean that you need to spray.

Daniel McGrath:

Farmers have a tendency to focus on mature plants, the big plants, and the dramatic damage symptoms caused by Fall armyworms feeding in the world. In scouting school, they learn that the critical [inaudible 00:25:06] times to pay attention are at the seedling stage and at early cob development. Damage to the seedlings and damage to the young cobs is where your biggest impacts from Fall armyworm feeding comes from. what do farmers need to know? Check your seedlings, control small larvae before they move into the whorl.

Daniel McGrath:

Now, when the tassel comes, it pushes the larvae out of the whorl, where do they go? They go to the base of the cobs. What do farmers need to know? Check during early cob development and control larvae before they penetrate the husk.

Daniel McGrath:

Now, agricultural professionals are open to additional messages because they're not only focused on protecting the crop, but they're very concerned about controlling the overall cost of Fall armyworm management. In order to manage or reduce pesticide use without putting the crop at risk, one needs to do an accurate job of risk assessment. It's necessary to take into account, not only the density of the larvae, but also the size of the larvae, the plant growth stage, and weather conditions. An experienced scout will only need, to scout a field, is a piece of paper and dull pencil, and an experienced scout should take about no more than 15 minutes to scout a hectare of maze.

Daniel McGrath:

In some cases, monitoring and scouting a reduced pesticide use by 40% or more, and monitoring and scouting are central to the integration of biological, cultural, and chemical control.

Daniel McGrath:

Touching briefly on efficacy testing, it's important to recognize that with the Fall armyworm, the plant insect interaction is complex. It's easy to produce misleading results when testing the efficacy of materials and methods. We strongly encourage pesticide regulatory staff and researchers to monitor egg laying pressure with a pheromone trap, and use a scouting protocol when conducting efficacy tests. It's important to track not only plant damage, but also egg laying pressure, the plant growth stage, and the larval size, which determines the vulnerability of the larvae to the materials and method.

Daniel McGrath:

Key results to date include the widespread utilization of the IPM manual for the training of trainers across Africa and Asia. And there's good evidence that many of the key messages associated with the scouting schools are reaching small holder farmers. In terms of next steps and what is needed today, we need to help the USA ID missions to deploy the revised Fall armyworm manual, which will be coming out shortly in order for the next level of training for the multiple audiences in scouting and monitoring. USA ID needs to help Africa and Asian countries to transition to more cost effective, low density monitoring systems that focus on supporting farmers, especially when farmers are trying to reduce pesticide use. with that, I yield my time to the chair. Thank you very much.

Rob Bertram:

Thank you, Dan. That was a really helpful presentation, and I think one of the things that you reminded us about is this critical issue of getting the test at the right time. Also, I think this relates back to the alpha toxin issue and the food safety issue in terms of the cob stage and this is something, again, that's such an insidious impact associated with Fall armyworm, but also very early on when the damage isn't really very visible, is also critical. Of course, once they're in the world, they're a lot less vulnerable. Before we move on, let's take time for one question. Zachary, do we have any questions?

Paul:

Yes Rob, we've got quite a few rolling in. One quick one from Justice [inaudible 00:29:44] currently looking into nitrogen fertilization on maze growth and development linked to Fall armyworm damage. Will this help the maze to recover from the attack?

Daniel McGrath:

Those of you who were with us in Hyderabad India, had an opportunity to look at one variety of maze, which was heavily infested with Fall armyworm and four rows had an adequate fertilizer program, and four rows had an inadequate fertilizer program. The difference was very dramatic. The robustness with which the plant is growing makes a huge difference in its ability to recover, even from fairly high levels of Fall armyworm damage. I would warn you that fertility does not have an impact on the susceptibility of the cobs to Fall armyworm damage; so it's important to check not only at the seedling stage, but also at the early cob development stage, over.

Rob Bertram:

Right. Thanks for that question and for that great answer, Dan, and I think it's just double underlines this issue of good agricultural practices in so many of the contexts in which we're trying to work and farmers are trying to make their living and feed their communities.

Rob Bertram:

So now we're going to move on to unpack some of the tools that both Joe and Dan have talked about today, and we're going to start with [Prasanna 00:07:15]. Dr. Prasanna is unfortunately somebody who I have on speed dial on my phone, I'm constantly turning to him for help and advice, but today he's going to help us all by providing some real insights into the roles of especially a host plant resistance, which is one of the areas under the arc for the taskforce in which Summit and Dr. Prasanna Prasannally have been leading.

Rob Bertram:

And so, Dr. Prasanna, thank you so much for all your contributing and we're really interested to hear from you about the progress being made in combating Fall armyworm and using this critical tool. Thank you.

Dr. Prasanna :

Many thanks, Ralph, for this kind introduction. It's always a pleasure to interact with you, no matter what time or what day it is. the topic that I'm going to focus on is the host plant assistance to our Fall armyworm management. This is the work that is done by a very dedicated group of researchers at Summit. I will just name a few like Joseph Bean, Don McCumbie, Annanie Bruce. All these guys have tremendously contributed to what I'm going to present here.

Dr. Prasanna :

This work has been collectively funded by a number of agencies, [inaudible 00:08:47], key agency here and apart from that, [inaudible 00:32:51] has such good [inaudible 00:32:53] maze, which has largely contributed to the work.

Dr. Prasanna :

So as [inaudible 00:32:58] pointed out, a host plant assistance is a very, very important component of the integrated pest management approach towards controlling many insect pests including the Fall armyworm. But breeding for resistance in maze at Summit to these insects, not five years but 10 years old, but almost now four decades old. The CDs publications came out in 1990 on breeding for resistance to insect pests such as Fall armyworm.

Dr. Prasanna :

One of the most notable land races that contributed tremendously to these efforts at the Cuban flinch, besides the touch panel maze. So both of them, one coming from Cuba, another Landry's collection coming from Mexico, both of them have very, very significantly contributed to systemic efforts on developing germ plasm resistance to insect pests.

Dr. Prasanna :

The first germ plasm that has been happening since many decades. The person which I have showed in this photograph here is John Nim. John Nim unfortunately passed away two years back. But in the work that he has done in 1980s and 90s has led to a collection of germ plasm that has been used not only by Summit, but also by researchers at USU Mississippi at the universities in the US. So John, in 1984, in one of the advocacy phase, we concentrate on attempting to identify and use most stable resistance to larval feeding of the antibiotics from [inaudible 00:34:48] Plant problems [inaudible 00:34:50] in order of priority and as expressed in a notarized situation under field conditions. That, in fact, remains the dating principle in our efforts to seam large collections of germ plasm [inaudible 00:35:05] in Africa and also in Asia. Summit with support from USA, and [inaudible 00:35:11] has established a stream house complex.

Dr. Prasanna :

What you see here, there are seven such theme houses each almost three foot half an acre size, but we have around 13 such theme houses at [inaudible 00:11:24], our partners, Kenya [inaudible 00:35:28] and livestock, such as in Calro, center it at Kibico. Similar walk people facilities we are planning to establish at Harare and also in Asia. So using this complex, we have seen around 3,124 inbred lines, and more than 3,200 fleet commercial hybrids, against Fall armyworm and the artificial infestation that needs a massive eating of the following larvae then identified and validated. [inaudible 00:36:03] Fall armyworm tolerant in [inaudible 00:36:05] whether they came from Latin America, or from the African germ plasm, and then disseminated some of the key Summit made lines. These are elite inbred lines, including GML 71, 125, 330, 338, 370, 574.

Dr. Prasanna :

These are some very, very good GMLs. If you really wish to strengthen your breeding for resistance to Fall armyworms, a number of partners, public sector partners in [inaudible 00:36:36] have you seen with the CML from Summit. More importantly, our germ plasm screening efforts do not just limited to Fulia damage ratings. Fulia Damage has to be shut down the less than, or equal to five on a one to nine scale.

Dr. Prasanna :

But the ear damage is also very, very important it has to be asked to be not more than three on a one to nine score. This is as Rob pointed out the higher layer damage, the greater opportunity or [inaudible

00:37:09] option producing [inaudible 00:37:10] microdots and petitions, yet we affect those years and make them vulnerable to a number of issues. [inaudible 00:37:20] also under Fall armyworm artificial [inaudible 00:37:23] is also equally important, not just for the damage rating [inaudible 00:37:28] how much yield do get, and what are the other relevant rates that are present in the genetic backgrounds of these varieties? A farmer is not going to grow a Fall armyworm variety, which is highly vulnerable to drought or to some other disease. So when we do breeding for resistance, it's not just an overnight job, We have to make sure that these varieties combine all the relevant traits that are needed by the smaller departments.

Dr. Prasanna :

But as you can see, some of our Fall armyworm [inaudible 00:38:02] are showing excellent response. These are as good as you can see here with the vulnerable varieties, showing a lot of Fulia damage as well as ear damage and the target High bridge much less damage at [inaudible 00:14:19] stages. So similar, ongoing on station and on phone validation trails at multiples, we are, we are now presently screening eight, very promising Fall armyworm following three commercial hybrids, along with four carefully selected susceptible commercial checks under different experiments, [inaudible 00:14:41] experiment, and the Fall armyworm on station trials at six different sites, and then natural infestation. There are [inaudible 00:38:52] at around 16 sites in Kenya, the Fall armyworm natural infestation, but under farmer management conditions. So the data, once they are available to us in the last quarter of this year, there'll be a stage gate advancement path.

Dr. Prasanna :

We'll be in a position to release to our partners, the first generation Fall armyworm [inaudible 00:39:11] hybrid from Summit so that's the most important news here so there is a plenty of opportunity to get varieties that have excellent resistance to Fall armyworms with much less a Fulia damage or even ear damage and good drainage. Again, this is another experiment that is ongoing [inaudible 00:39:37] in Kenya. The Fall armyworm on farm validation trial. Again, you can see an excellent, hybrid compared to one of our very popular commercial hybrid releases to Summit germ plasm, but again, showing high vulnerability to Fall armyworm. The native genetic resistance, what are the next steps similar to the Mellon Septra study? We would like to accelerate the development of with elite maze varieties. With Climate resilience, and following thousands in diverse genetic backgrounds, relevant for Africa, as well as Asia and the work that is going on right now on the genomic regions for Fall armyworms resistance in maze.

Dr. Prasanna :

We'll be validating them, we will be first of all be Identifying discovery, validation, and deployment. Those stages have passed before we routinely use genomic assisted breeding. We also need to cannulate [inaudible 00:40:37] public private partnerships, but deploying those, elite Fall armyworm the right. Is it the faster varietal turnover and demonstrate the benefits of integrating [inaudible 00:40:49]

systems with other IPM tactics? That's the question, did the gap IPM that was highlighted by [inaudible 00:40:56] and the biological control, similar to their purchase taken in some of the countries, the BT maize is another most important tool in the IPM toolbox. There are numerous GMA High bridge, including various combinations of [inaudible 00:41:14] and [inaudible 00:41:17] that are commercially available in Brazil, as well as North America. These are deployed so widely in the US and Brazil the thing that at one page, in terms of not only meeting their domestic needs, but also in a position to export maze to different parts of the world.

Dr. Prasanna :

That's really important. Fall armyworm has been dead for several decades in countries, but the US and Brazil have kept up their advantage. You said the assistant management products [inaudible 00:41:50] are indeed extremely important, but GM needs to be sustainable and continue to be effective in farm management. Those are important principles with respect to the [inaudible 00:18:02] BT maize in Africa, What is the status? [inaudible 00:18:11] an important VT event is the presently showing high levels of Fall armyworm control in South Africa, demonstrative to our project led by office connected touch and technology foundation, and they are donating this plant seeds for the benefit of a small production in Africa. Similarly, [inaudible 00:18:33] although not perfectly designed for Fall armyworm control [inaudible 00:42:38] by the target countries in Africa is showing partial, but significant control under Fall armyworm natural infestation.

Dr. Prasanna :

What's this, the commercial susceptible checks. Summit has contributed to this project by providing as many as 49 unique blanks so far, and the [inaudible 00:43:01] especially [inaudible 00:43:02] and 49, inaudible 00:43:04] BT maize is also being grown in Asia, almost 610,000 hectares and Philippians and almost 50,000 hectares in Vietnam. There is also, vApp a [inaudible 00:43:18] 61, 62 that is either alone or stack [inaudible 00:19:23] so Asia, some countries are focusing strongly in terms of BT maize deployment. And there is opportunity for other countries also, perhaps to stimulate some of this events, my final slide. we need to remember that BT based assistance and need to get it into the system could be quite complimentary. They are not exclusive, and you can successfully stack the BDE then in an excellent drought, tolerant, MLM resistance, and Fall armyworm [inaudible 00:43:55] genetic backgrounds, that could be a much more sustainable and durable way of Fall armyworm management for the future. I thank the partners in Africa and Asia, USA in particular USDA for providing tremendous support, for this initiative. Thanks a lot.

Daniel McGrath:

Thank you, Dr. Prasanna for that really great overview. I think we're not going to take time for a specific question now, but for people who have those lets bring them back during the, the broader discussion a little later on. I want to just flag a couple of things that from your presentation, Dr. Prasanna. One is how important it is to be able to use genetic resources from around the world. In this case, from the

Caribbean and Mexico, to address the needs of farmers in Africa and Asia, this is really exciting, it's why it's so important that we continue to find ways to globally utilize and make these incredibly important genetic resources available to the needs of all of the farmers in the developing world and worldwide for that matter. Second point is just the importance of seeing the research in the farmer's fields to Dr. Prasanna

Daniel McGrath:

I want to congratulate you for that. I think we're going to move on now to a situation where, we can use host plant resistance, either BT or classical resistance as Dr. Prasanna has discussed, but there are also situations where we need to come in with more specific controls. I'm delighted to say that we have Paul Jepson, who is again from Oregon State University, where he leads the direct integrated plant protection center, and Paul similarly has been like Dan, very, very involved with this global effort. He's serving with the FAO technical working group and on the technical committee of the global action that I mentioned earlier. Paul is a leader in this issue of how non target species are affected, So he approaches the pesticide issue and the tool, as using it in a smart way, as Joe mentioned in his first presentation. So Paul welcome and over to you.

Paul:

Thank you very much, Rob. Can you hear me?

Daniel McGrath:

Yes. I hear you loud and clear.

Speaker 1:

We can hear you.

Paul:

Good morning, everybody around the world, Yes Our project is addressing pesticides and Fall armyworm along with the many other people around the world. Of course, my co-authors are Katie Marie. Who's an anthropologist I've worked with at Oregon State University makes the trailer from CRS in malaria, who was incredibly helpful to us when we bought that Maxim saw FAL Senegal with whom we're working on an application manual, which I won't have time to talk about today. Although that is a very important aspect of this problem. I just wanted to capture the challenges because unfortunately, with regards to Fall armyworm, the marketplace has been rather flooded with broad spectrum And often highly hazardous pesticides. These are often inexpensive also, and we believe there's a high level of uptake by farmers. This is not only is hazardous to farmers themselves and public health and the health impacts of this, of not really being documented, there's a seat at the table, unfortunately, still empty for that measuring health impacts of pesticides in this outbreak. However, there's also an ecological impact

with large wide-scale suppression of natural enemies early in the season. This inhibits the opportunity for RPM development and promotes pest outbreaks. We see this commonly here where [inaudible 00:48:03]

PART 2 OF 4 ENDS [00:48:04]

Paul:

Pest outbreaks. We see this commonly here where pyrethroids are dropped and pushed into the marketplace early in the season. I mean, it almost conditions agriculture for very volatile, high pest outbreaks circumstances. So, we see this progression from left to right. So, phase out of highly hazardous materials and high-risk pesticides as being rather important, if we're to build opportunities for IPM. I've been involved in regimes, such as this and outbreaks of this form, although not on this scale, but for a number of decades, and this is a common pattern that somehow we would argue that we really need to do better and not rely on these mechanisms, which seem to have the opposite outcome for what we would wish in terms of promoting Pest outbreaks. So, working with Katie Marie in Malawi, our approach has been, what I'm going to summarize today, is going to the farmers themselves, that it's serving their need, characterizing local marketplaces, and then responding those local needs and circumstances with targeted education.

Paul:

And so, I will post at the end of my talk, open-source links to the three articles I'm going to be talking about. Here, with regard to pesticides and IPM in Malawi, farmers and extension agents were asking for much more information to support their decisions about pesticide selection, and also much wider scale education about pesticide risks. But what we noted most was gaps in the continuity of information flow from researchers even in centralized offices in Malawi through extension to farmers, because there's no gas to put in the motorcycle tanks to get extension workers out to farmers. So, there's multiple issues that need to be addressed. Some of them very simple and not over expensive in order to get information flowing to the people that are making the decisions that are so critical. Work in Kenya, which has now been in the final stages of review, has revealed a very similar pattern of those slightly altered practices farmers are using.

Paul:

And so, you can go to Katie's reports, and this one will be published soon to look at what farmers are employing against the wide array of pests and diseases in maize, not just against full army worm. But again, a lack of capacity to understand pesticides and how to apply them properly is something that's a major issue if we are to argue that pesticides have a role in fall armyworm management. So, one thing we've been doing round the world is to ask pesticide dealers to line up the chemicals farmers are buying and to tell us which ones they consider to be most efficacious. And this is just one of a number of dealers we visited in Malawi, and these pesticides include abamectin, benzoate, and avermectin, which

have some challenges for small holder farmers in health terms, and some risks are natural enemies, but they also include deltamethrin and profenophos, a very highly toxic organophosphate pesticide, which is no longer used in the United States. My screen has frozen. I can't advance slides. Can you still hear me?

Zachary Baquet:

Yes. You can just let us know when you want to advance to a slide.

Paul:

Can you advance to the next slide, please? I can't see. Has the new slide come up? My screen has frozen.

Zachary Baquet:

Yes. It's the one that say these profenophos-

Paul:

So, I'll ask you to describe the slide for me and I'll just move on through the end of my presentation, okay? And then I think I'm locked out after that. So, pesticide impacts or natural enemies are a thing I can not deal with in detail here, but fall armyworm are natural enemies are far more exposed to pesticides then fall armyworm is, and care must be taken in when and what you are treating with. And using synthetic pyrites as an organic phosphate, or an organic pesticide is not compatible with IPM because you're eliminating natural enemies otherwise causing some pest limitation. Next slide please, and I believe there shows a group of small holder farmers in Malawi who were applying pesticides via bucket and I brush dipped into the buckets. And again, the chemicals available to these farmers, they were reporting up to eight uses of synthetic pyrethroids a year, and up to four uses of prophenofos, no fall and around half to 60% of farmers reported using these pesticides and profenophos, in particular, was causing very severe health impacts to these farmers. And you can find this reported in Katie's reports.

Paul:

And I'm going to have to close out the seminar and reenter in a couple of minutes, and then I will post links to these reports when my talk is completed. Next slide please, and can you tell me what this is? Hello?

Zachary Baquet:

It's the [crosstalk 00:05:18].

Speaker 2:

Yes, it's a chart with colored boxes.

Paul:

Okay. So one thing we have done is to take the 50 or 60 pesticides, and extremely disappointingly, I've never seen anything like this, we've filtered through the different chemicals available, going left to right in this figure to isolate those that's a low risk and appropriate for small holder farmer use in the marketplace and have efficacy against fall armyworms, which is already known and has been confirmed in much research that is now ongoing and much of which is already being published. I find it incredibly disappointing that seven out of 56 pesticides that are on sale in Africa are actually appropriate for small holder farmer use, and again, it's something that many of us on the call could address in our different systems and programs and networks to simply do better with. Next slide please, and I believe this might show us that's a publications I'm trying to complete now, Rob, as quick as I can.

Rob Bertram:

That's fine. [crosstalk 00:54:21].

Paul:

Right. So, one thing we've done is to publish our work in very high impact journals to subject it to high levels of peer review, and we have published a set of models and approaches to evaluating pesticide risks, as well as efficacy in our latest article so that you can have a guide to pesticide selection that is not simply based upon lines of bottles on a shelf in a dealer's store. And so, again, bearing in mind that protective clothing for farmers is not widely available and affordable and unhealthy to use because of heat pressure, this should guide us to chemicals that are appropriate for small holder farmer use. And there are low risk materials to against which fall armyworm is susceptible. Next slide please, and I believe that shows a large table, correct me if it doesn't, but in the top right hand corner of the table are those seven products, and this includes natural products that are sold as commercial pesticide formulations, and can also be concocted by farmers. For example, Neem is an extremely effective pesticide against fall armyworm.

Paul:

It's includes one of the bacillus thuringiensis species, or subspecies, and also compounds such as [inaudible 00:07:44], which is a synthetic pesticide, but extremely effective against fall armyworm and not very toxic to the natural enemies. So, there are alternatives out there. Next slide please.

Rob Bertram:

This is [crosstalk 00:08:02].

Zachary Baquet:

[crosstalk 00:56:03] Barriers to IPM adoption.

Paul:

Yeah. So, I just want to thank you everybody for listening. I'll leave the seminar and reenter and try and post access to these articles. One thing we have done on the USIPM and USDA for our next service sponsorship is to publish, for the first time, a rigorous scientifically based comparative summary of the risks and hazards posed by over 650 commonly available pesticides. So, there is a basis in this work for you to select chemicals independently and to make use of this information, in trying next time, an invasive test appears, or during this presence outbreak, to select materials that are of low risks to farmers and natural enemies and other environmental compartments, as well as offering some efficacy that you can determine with local trials and with our gathering experience. But thank you so much for listening and I'm sorry about the small technical difficulties, but I don't think it's affected you too much. Thank you everybody.

Rob Bertram:

Thank you, Paul, for that really great presentation, and I want to link together the last two presentations. Both of them underscored the importance of policy in terms of what is available for farmers and giving farmers the widest and best array of choices, be it around seeds, BT, or pesticides, and working on effective, science-based regulatory, and efficient regulatory procedures, is an important compliment to the kinds of technologies that we've just been hearing about from our speakers. So, I'm not going to take a question because we're at time, but we will come back and hopefully, Paul, you'll be back in with us, and our next speaker who has just appeared is Sarah Page. And Sarah is going to round out this discussion today by bringing it all together at the level of how do you actually work in farmer context in the context of fields, natural resource management, markets and value chains.

Rob Bertram:

So Sarah is the technical advisor for sustainable livelihoods and landscapes at Catholic Relief Services, and Sarah we're really delighted to have you come as sort of the integrator for all of the specific and sort of technical information we've had, and how does this play out? I think you're going to help us understand that. Over to you.

Sarah Page:

All right. Thank you, Rob. Can you hear me okay.

Rob Bertram:

Perfectly.

Sarah Page:

Okay, great. So, I'm going to dive into our case study, which focused on communication strategies and effects on fall armyworm management and Uganda. The impetus for this study came from a concern that insufficient information was getting to different farmer segments and from an interest in exploring two-way communication channels to disseminate information to farmers while also giving them a voice. And this was all in order to improve fall armyworm response and the adoption of management practices among different stakeholders. So, Uganda was chosen as the site for this case study in part because of the coordinated communications campaign implemented in that country, which was led by the Ministry of Agriculture, Animal Industry and Fisheries in coordination with the National Level task force. So, our study had four main questions that looked at farmer access to information, the adoptive management practices, the results of those practices and how farmers communicated back to the system. Whoops, apologies.

Sarah Page:

So, we conducted the study in three districts of Uganda and employed a mixed methods approach to data collection. Respondents for them post categorize into wealth core tiles, and there was a negative correlation between gender and wealth with more women being in the lower core wealth four tiles. So, for each of the main study questions, I'm going to quickly present some of the key results. And then I'm going to jump right into some of the conclusions and recommendations related to that topic. And then, I'll summarize some of the main takeaways at the end. So, first, how are farmers getting their information about fall armyworms. We saw that there was a relationship between wealth and gender and information access. So poor farmers and women accessed fewer information sources, and most were really relying on secondhand information through their social networks. Farmers groups were the preferred source of information because of accessibility and the perceived trustworthiness of that information.

Sarah Page:

So, groups allowed people to collectively validate what they're hearing. And the information source tended to differ somewhat depending on the aspect of fall armyworm control. So, for example, extension workers, agro dealers, and radial we saw were more widely used for accessing information about synthetic pesticides more so than for other non chemical control measures. And also, with the exception of radial, we felt that there was limited use of ITTS, especially by poorer farmers, which relates to a lack of ownership of devices that would then facilitate access to those channels. So, based on those results, how can we then better facilitate access to information across different farmer segments? I think these offer great potential to build awareness of a technology or a pest, but should be used as a compliment, not necessarily a central feature, and although ownership of basic cell phones and even smartphones is growing, they're still a large percentage of farmers who don't have access to those devices.

Sarah Page:

Therefore there's a need to identify ICT connectors, such as youth or lead farmers who have access to technologies and could bridge that digital divide and also cross language barriers. And we know that there is a lot of good work being done in this space, but the data suggests that more could be done. And if groups are essential platform to access information, we need to ensure that those groups are both inclusive of women and poor farmers, and I'll talk a little bit later how those groups could look differently to better facilitate information sharing, innovation and feedback. So, next, what practices were farmers implementing and what were the results of those practices? So, the information campaign was effective in changing farmer behaviors. As an example, the majority of farmers we spoke with were using chemical pesticides control fall armyworm, which is a departure from common maize production practices previously. There was also a slight reduction in maize yield loss following the campaign, however, yields did not bounce back to pre-fall armyworm levels, and there could be many factors contributing to this, such as a steep learning associated with the use of pesticides, the need to continue to focus on good agricultural practices. And then also some of those issues with assessing yields that Joe mentioned earlier on.

Sarah Page:

And poor farmers were more likely to adopt practices or follow guidelines that are not cash dependent, such as targeted pesticide application and spraying at the correct time of day, versus those aspects of control that did require a cash input. And this suggests that costs for different fall armyworm control practices can be prohibitive for some farmers, and we also saw evidence of misuse of synthetic pesticides. We also found that farmers, especially poor farmers, are still proceeding full army worm as a threat. And this is likely linked to an inability to save for the purchase of pesticides, which with the farmers that we spoke with, was really viewed as the main or the most effective control measure. [inaudible 01:03:54] So, how can we support farmers to improve management of fall armyworm? There's wide variation in use of chemical pesticides, which suggest that much more work needs to be done to support the ability of service providers to give better, more specific information, and that can be a really complicated message.

Sarah Page:

We'll need different ways of getting information to farmers and need to think about how best to layer or sequence that information and information campaign should be designed to better reflect the diversity of contexts and respond to farmer segments, and when possible, offer different tailored approaches or different sets of messages, depending on different skill levels and economic levels. And Dan in his talk mentioned a perfect example related to layering information about scouting depending on the audience. And we should also help farmers to better understand the full economic cost of adopting or not adopting different management practices. And this requires helping to understand the expected cost and returns, and requires a certain level of financial education. It looks like I can't see the presentation. So, please let me know if it's continuing, and please advance to the next slide.

Rob Bertram:

Yeah. I'm not seeing your slide at this point, Sarah. I'm not sure what happened.

Sarah Page:

Okay.

Speaker 2:

Yes, we're restoring It. [crosstalk 01:05:27] saw somebody touch the pod.

Sarah Page:

Okay. So, lastly, how are farmers providing feedback? We saw that farmers are actively experimenting, but there's little documentation or co-validation of those practices, and learning and feedback cycles were somewhat weak. There was some, but limited, evidence of how farmer feedback was being used to influence to programming and policy, and this suggests that continued top down approach to extension. And lastly, there was limited use of ICTs to provide feedback or solicit more information, even though we do know that there is work being done in that space using those tools. So, to strengthen farmer feedback loops, we need to continue to advance research on efficacy of farmer direct approaches in a participatory way, and update content using an iterative process, looks like it happened again, well, I'll just keep going, that incorporate new learning and evidence, but also incorporate farmer's perspective on how they are not using information. And farmer feedback loops could be strengthened by repositioning extension workers as facilitators, rather than the experts. And participatory efficacy testing is a way to improve innovation and problem skills so that farmers can be more self reliant.

Sarah Page:

And this could be done in a farmer learning center model, and this model differs from kind of a traditional farmers group in that they focus not on the top down training cascade, but on providing spaces to get together, to work on technical information in a hands-on way so that farmers can better manage the innovation and learning process themselves. And I'm not sure if I'm out of time, but just to highlight some of the main takeaways. Once again, is that pesticide use we saw is widespread amongst the respondents, but farmers and other actors need more specific information at certain decision points. And ICT offer immense opportunity to scale information dissemination, but there's still an important place for farmers groups and face to face interactions. And the information flow continues to be top down with limited evidence of effective feedback mechanisms, and this indicates an opportunity to better leverage farmer learning and innovation. And just lastly information campaign should be iterative and reflect diverse contexts and realities of different farmers segments, and with that, I'll end. Thank you. Oh, there's my contact information.

Rob Bertram:

Thank you, Sarah. That was just terrific, and you really wove it all together for us in terms of how this all plays out in farmer's fields. I think I just want to flag how critical the issue of knowledge and information is, and we've heard that all through the morning, and then now to hear how it actually plays out in the importance of wealth, of gender, and of ability to use ICT and also the tremendous potential to use them in two way flows going forward. So, with that, we're going to turn to the open discussion now. There's been a really active chat box and many, many questions. Zachary, I hate to burden you, but can you start us off on this process please, to answer these so many great questions that are coming in?

Zachary Baquet:

Sure. Rob and yes, to second that, the chat box has been quite phenomenal. Everyone has been asking questions, sharing their experiences, sharing their knowledge. It's greatly appreciated. So, thank you everyone. We'll try to get through as many as possible. For our first question for Sarah from Bosibory Bvet, where there challenges amongst farmers access to ICT on their smartphone, in terms of network coverage and access to continuous data bundles on their mobile phones? If so, how did you overcome this?

Sarah Page:

That's a good question, and I think, related to the then issues with smartphones is actually the vast majority of farmers that we interviewed did not actually have ownership of a smartphone. And then we didn't, unfortunately, get into those details related to coverage. But that's a good question. That was an oversight. There's probably many factors contributing to why farmers don't have readily available use, but I'll say from my own experience, and most of the places where we conducted the survey, that there was coverage with perhaps a few exceptions. Thank you.

Zachary Baquet:

Thank you. For another question for Osana, from Barbara Coloey. No N, sorry, Caloey. Are there available insect resistance management protocols for the use of BT corn against fall armyworm for use [inaudible 01:10:28]?

Dr. Prasanna :

Yes, there are protocols for managing the BT Con to delay the incorrect resistance, and information on the BT maize that has been made available through our fall armyworm IPM manual for Africa, and other around [inaudible 01:10:49]. So, the issue is coming up soon, it's in the process of preparation, but there is a comprehensive chapter on host plant resistance covering both native genetic resistance and the PTB resistance in 2018 released IPM manuals for Africa.

Zachary Baquet:

Thank you. Another question for Dan or Joe from Abu Yarma, ICIPE, or the International Center of Insect in Physiology and Ecology is promoting the push/pull technology to control fall armyworm. How do you compare that approach to a GAP, G-A-P?

Daniel McGrath:

Joe, Shall I take a stab at it. And then turn it over to you?

Joe:

Sure. Dan, go ahead.

Daniel McGrath:

Intercropping and push/pull systems clearly have a place in the suite of strategists we have for managing fall armyworm. I think they're particularly relevant, the push/pull system for small holder farmers, especially those-

PART 3 OF 4 ENDS [01:12:04]

Daniel McGrath:

Relevant the push-pull system for smallholder farmers, especially those that are raising livestock. Both the GAP, the suite of activities associated with the Good Agricultural Practices, and push-pull systems require major changes in the way we grow maize. I think that may be something we need to look at. The only cautionary note I would offer is that I haven't seen much data about cob damage in push-pull systems. I'm a little bit nervous about when you have a situation where you have high egg-laying pressure at first tassel and the weather is dry, whether the push-pull systems will protect against cob damage. Joe?

Joe Huesing:

Thanks, Dan. I would only add a couple of points. The basic level of GAP, which includes use of fertilizer, good quality seed, and soil pH adjustment should be something all farmers should use. If you then step up the level of complexity to a process like push-pull or intercropping, as Dan said or mentioned, you have to consider the complexity for the farmer. It is harder to implement, which means it's more difficult to scale and thus, is probably not as sustainable. It doesn't mean that it's not usable, but it's something you have to consider when you promote that to a farmer. Most farmers, as Sarah pointed out earlier, tend to like mitigation processes that are single-point or that are simple. Just ensure that when you're implementing those types of programs, you consider those factors in your decision process. Over.

Rob Bertram:

Great. Zachary, next question.

Zachary Baquet:

Next question is for you, Rob. We've had several questions around the approval of GM technology in Africa, and we want to get your comment on it.

Zachary Baquet:

As an example, Mary Asante had the question of "how do we get BT maize to the research institution CRI for further transfer to smallholder farmers in Ghana because the aggregation of the farm is huge there?"

Rob Bertram:

Well, thanks, Zachary, and thanks, Mary, for that question. Well, this is a long-standing issue. I think at the scientific level, there's great interest. For example, we have a research partnership with CIMMYT and the African Agricultural Technology Foundation and seven national partners from Ethiopia all the way to Mozambique around both drought tolerant and also BT maize. As Dr. Prasanna said, some of these BTs are actually quite effective against a fall armyworm and there're others that are even better.

Rob Bertram:

We know South Africa is already benefiting from the technology, and that's because they have a functional biosafety regime that's working. We are working with a number of partner countries, especially through the program and biosafety systems led by the International Food Policy Research Institute. I think by and large, one of our approaches on this, Zachary, has been that we put together our work on technology partnerships and align that with science-based regulatory capacity partnerships and development.

Rob Bertram:

Mary, in terms of Ghana, we do have partnerships at the level of the Ghanaian government. Ultimately governments through their own processes need to make informed decisions for themselves. What I can say, though, is that the voice of the research community, and of the farming communities, and the evidence that comes from, say, scientific steps like controlled field trials where officials can actually see the impacts, that was, I think, one of the opportunities when African leaders went to Embrapa in Brazil, they could see for themselves the various ways that Brazilian farmers were effectively controlling the pest.

Rob Bertram:

This is a continuing effort. It needs to be a partnership across this whole community and with our friends in the environment community. We know that some of these technologies are hugely environmentally friendly because they would replace a lot of negative impact approaches that are unfortunately still being used, despite the efforts of people like Dr. Jefferson. Back to you.

Zachary Baquet:

Okay, thank you, Rob. To follow up on that question, we had a number of questions around GM and BT technology for Prasanna. A couple of those were, is CIMMYT planning to integrate MLN-resistant traits and fall armyworm-resistant traits in the same materials? Was there any report of fall armyworm damage on GM corn? Can you still use it as part of IPM?

Dr. Prasanna :

There is some background noise, but I will go ahead. Yes. That is a very, very important aspect. It is not just all armyworm tolerant, but we need to integrate into genetic backgrounds that have other relevant traits. For Eastern Africa, definitely we are integrating the armyworm-tolerant into drought-tolerant and MLN-resistant genetic backgrounds. Similarly, for Asia, it will be a different set of key traits.

Dr. Prasanna :

For example, both flowering stalk rot and Fusarium stalk rot resistance and other key diseases that are prevalent in Asia. Based on product profiles, we need to integrate the native genetic resistance to fall armyworm in those appropriate genetic backgrounds. That's an extremely important aspect.

Dr. Prasanna :

The second question is what, Zachary?

Zachary Baquet:

The second question was, "Was there any report of fall armyworm damage on GM corn? Can we still use it as part of IPM?"

Dr. Prasanna :

Yeah, definitely. BT maize is undoubtedly an important part of the IPM [stone book 00:01:18:52]. However, because of various reasons, for instance lack of proper implementation of insect-resistance management approaches for proper stewardship, there is a possibility that some of these events may be overcome by insects for a period of time. It can take four years, five years, six years. But it did happen in countries like Italy and others, South American and Latin American countries. So that possibility is always there. But what is really important here is PT does provide an excellent option, as long as it is used very carefully by the smallholders, the farmers. Let's remember that even in case of PT events,

different events may have different levels of resistance. Not all BT events are same in terms of the level of resistance offered. That's the reason why I am emphasizing the point. It's important to track those BT events into, for example, fall armyworm tolerant genetic backgrounds coming from native genetic resistance, and the possibility of sustainability enhances much more.

Zachary Baquet:

Thank you. This next question is directed to Joe from Ryan Roberge. "Is there any evidence that shows that maize grown according to conservation farming methods, including use of both organic and inorganic fertilizer, low till, and planting with the first usable rains has demonstrated positive outcomes performance in the context of fall armyworm attacks?"

Joe Huesing:

Yes, there are decades of experience showing that use of proper fertilizer, and the source of the fertilizer doesn't matter. It doesn't matter if it's chemical fertilizer or composted fertilizer, as long as the NPK levels are adjusted in the soil, pH ranges adjusted properly. That the key point is to use good seed and also to properly fertilize the crop. In terms of conservation tillage, it's a very good question. Conservation tillage has many benefits all its own. These discussions we always focus on fall armyworm, but as many on the line today know, there are a multitude of challenges in raising maize, including other diseases and other insects, and in the African context in particular, water. Drought. And so conservation tillage is important for growing a healthy maize crop, independent of fall armyworm, just in terms of the conservation of moisture. I think I hope that answered your question. Over.

Zachary Baquet:

Thank you, Joe. For the next question, we're going to Dan. We had a question from Neil Miller. "Doesn't scouting at cob development stage contradict Feed The Future guidelines to not spray after flowering?"

Daniel McGrath:

Thank you for that clarifying question. The guidelines remain the same. If all you have is highly toxic insecticide, and you don't have access to protective equipment, then the answer is, don't spray after first tassel. And that remains our guidance. However, there are modern pesticides, and if a farmer has access to a modern insecticide, which is very low toxicity... Coragen, for example. Tracer. The LD50 on those materials is greater than 5,000 milligrams per kilogram body weight. So they're, they're less toxic than coffee.

Daniel McGrath:

If you have access to a low toxicity material, and you have access to protective equipment, and the weather is warm and dry, and egg-laying pressure is high, and you base your decision on cob scouting and an action threshold, it may well be worth your effort to apply a material after first tassel to save

your crop. So both of those are true. The guidance is if a farmer has only access to highly toxic materials and no access to protective equipment, then the guidance is, don't spray after first tassel. But the other is also true, and so we have a scouting protocol for cob scouting and an action threshold, and there are modern materials that could be applied safely. I hope that addresses your question. Over. Joe, do you want to say anything?

Joe Huesing:

No, I think that was well done, Dan. Thank you.

Daniel McGrath:

Okay. Thank you.

Zachary Baquet:

Thank you. So question for Joe, we've had several questions around host plants for fall armyworm. As an example, has anyone here observed heavy fall armyworm infestation on sugarcane and wheat? Another question from [Sanjeet Kumar 00:12:37], "Besides corn and sorghum, what is the next most preferred crop of this polyphagous insect?"

Joe Huesing:

Many people have heard, correctly, that the fall armyworm will feed on some 80 different host plants, and that's largely a function of the fact that the fall armyworm does not have a diapause capability. It has to continuously breed and produce larvae and complete its life cycle throughout a season. We've gotten reports. The fall armyworm infestations and other crops, sometimes sugar cane, sometimes wheat. Grasses for example, pasture grasses, Bermuda grass in particular. In general, I would say, so far I haven't heard of any of those that have risen to the level of concern. The particular strain that was introduced into Africa...there's two strains of fall armyworm, a rice strain and a maize strain. The maize strain predominantly feeds on maize, millet, sorghum, and according to the USDA experts that you can feel free to contact, it looks like it's predominantly the maize strain and that's generally where we've seen the damage.

Joe Huesing:

We should appreciate two things. First, if you have a very heavy moth flight, as Dan was talking about earlier, you will get damage on other crops besides just maize, just simply because the fall armyworm population density is so high. But that's not likely to be seen in subsequent years. The focus will probably be on maize.

Joe Huesing:

Let me address rice very quickly. Two points. We so far have not seen much damage on rice. Again, this is probably because it looks like a rice strain was not introduced. Will there be a selection for a rice strain in Asia because rice is so prevalent? We don't know, but we need to be aware of the fact that that could happen. Secondly, fall armyworm has arrived outside the Americas once. It's very likely it will arrive again from another source and that other strain could be introduced. With that, I'll stop there. Over.

Zachary Baquet:

Thank you everyone. [crosstalk 01:27:18].

Rob Bertram:

Okay. [crosstalk 01:27:18] Oh, Zachary, do you [crosstalk 01:27:21]

Zachary Baquet:

Sorry, Rob, I was going to hand it over to you, but please take it to wrap up the session.

Rob Bertram:

Okay. Thank you, speakers, for just terrific presentations followed by a great question-and-answer session. I think this whole discussion has really been about the evolution of this pest in Africa and Asia and how we're learning. We at first were really learning by virtue of what we knew in the Americas, but now it's really about learning from what's happening in Sub-Saharan Africa, in Asia, and in these new environments for the pest. So I think it's been wonderful to have a range of perspectives in terms of how knowledge, how technologies and practices fit together.

Rob Bertram:

Obviously this is a complex pest, it has various susceptibilities, and I don't think there's a silver bullet we're talking about. It's a range of things. And then compounding that, a couple of observations. One is the knowledge content of so much of what we heard about today, particularly the control in the field. The presentations from Paul, from Dan, from Sarah, and from Joe, really, about how we manage this pest. The role of information, tools, telephones, radio, other kinds of means of getting good information to farmers at all levels, and then trying to tailor that information to the economic opportunities that they have. Their ability to pay, for example. The other piece I think that was really very important, there's the policy piece. This has got to do with just getting new varieties or hybrids out of maize, or BT accessibility for farmers, or the pesticides. Getting those safer, newer chemistries, making them available quickly, and having regulatory systems that function where you have reciprocity, for example, across the region. All of that can be important contributor as well.

Rob Bertram:

We're looking forward now. We're in a context where COVID and locusts are also grabbing a lot of attention. And yet this very compelling situation with fall armyworm needs our continued efforts. We need information from all of you. We need the community to be sharing experiences about impacts, what's working, what's not working, and the degree of damage. Because all of that helps those of us trying to support your work, do a better job.

Rob Bertram:

Finally, I want to just thank Regina Eddie and [Chevonne Whiten 00:18:30] and Zachary, and our KDL team, Adam Ahmed and others, for their tremendous support in putting today's presentation together. All the work that's gone into this, I think it paid off beautifully, team, and I'm really grateful to have had an opportunity to be with you all. Thank you all very much. This will be recorded, and I think other materials, the presentations, et cetera, will be made available in about a week or so. Thanks everyone.

Rob Bertram:

Zachary, have I left anything out?

Zachary Baquet:

Nope. That's it, Rob. If you've registered for the event, we will be sending you an email with links to all the resources that Rob mentioned. There will be a transcript of the recording as well as a transcript of the chat box. I know it has been moving rapidly. People have been sharing quite extensively on their experiences asking questions and the like. We will have a separate document with all of that chat box there as well for you to access. We will also try to get to all of the questions that were unanswered as best as possible as part of that transcript. And again, thank you and appreciate your participation. Thank you for your sharing. We look forward to your future participation in webinars in the future. Thank you again. Have an excellent day.

Rob Bertram:

Bye everyone. [crosstalk 01:31:57] Thank you.

Speaker 3:

Bye.

Speaker 3:

(silence)

PART 4 OF 4 ENDS [01:32:57]